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Self-similarity principle: The reduced description of randomness

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Abstract

A new general fitting method based on the Self-Similar (SS) organization of random sequences is presented. The proposed analytical function helps to fit the response of many complex systems when their recorded data form a self-similar curve. The verified SS principle opens new possibilities for the fitting of economical, meteorological and other complex data when the mathematical model is absent but the reduced description in terms of some universal set of the fitting parameters is necessary. This fitting function is verified on economical (price of a commodity versus time) and weather (the Earth's mean temperature surface data versus time) and for these nontrivial cases it becomes possible to receive a very good fit of initial data set. The general conditions of application of this fitting method describing the response of many complex systems and the forecast possibilities are discussed. © 2013 Versita Warsaw and Springer-Verlag Wien.

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Keywords

complex systems, fit of economical and weather data series, self-similar (fractal) processes, solutions of the functional quations